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INFORM ATION COMMUNICATION TECHNOLOGY: A TOOL FOR DEVELOPMENT

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ABSTRACT

The role of information and communication technology (ICT) in accelerating development is drawing more attention. The rapid development and integration of spatial technologies such as GIS (Geographic Information System), GPS (Global Positioning System), and (Remote Sensing) ICT tools help to manage and interpret data about an area's resources and infrastructure, such as digital maps or images of a village, watershed or entire country. The tools include systems to store, manage and analyze geographically referenced data (GIS), devices that measure geographic location (GPS) and data collection systems that provide periodic land use, land cover and other thematic information (satellite remote sensing). Spatial technologies GIS-GPS-RS either individually or in combination playing very important role in development.

1. INTRODUCTION:

Information and Communication Technology (ICTs) are often associated with the most sophisticated and expensive computer based technologies. ICT are basically information handling tools- a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information. Application of remote sensing (RS), global positioning system (GPS), geographic information system (GIS) and combination of three S techniques will become a very important part of the different application which in turn responsible development.

Remote Sensing (RS): refers to the branch of science which derives information about objects from measurement made from a distance i.e. without actually coming into contact with them. RS refers to the identification of earth features by detecting the characteristics electromagnetic radiation that is reflected by the earth surface.

Stages in remote sensing:

- Requirement of an energy source
- Energy interaction with the atmosphere
- Interaction with the target
- Recording of energy by sensor
- Data transmission & processing
- Image processing & analysis
- Application

Advantages of remote sensing over ground based are

- **Synoptic view:** It facilitates the study of various features of earth surface in their spatial relation to each other & helps to decline ate the required features & phenomenon.
- **Accessibility:** It makes it possible to gather information about inaccessible areas where it is not possible to gather information through ground surveys.
- **Time:** These techniques save time & efforts as information about large area can be gathered quickly.
- **Multi disciplinary applications:** Remote sensing data are useful to different disciplines such as geology, fisheries, forestry, land use etc.

Geographically Information System (GIS): GIS is a computer assisted system that can input, store, retrieve, analyse & display geographically referenced information useful for decision making.

Components of GIS: GIS runs on the whole spectrum of computer hardware ranging from portable personal computers to a multi-user supercomputer & is programmed in a wide variety of software languages.

a. The presence of a processor with sufficient power to run the software.

b. Sufficient memory for storage of large volume of data.

c. A good quality high resolution colour screen.

d. Data input & output devices.

e. Live ware

Function of GIS:

a. Data pre-processing , manipulation & retrieval

b. Data analysis

c. Data display

d. Database management

Advantages of GIS:

a. GIS is application oriented

b. Frequent revision of digitized GIS data is possible.

c. Changes over time can easily & rapidly monitor through GIS.

d. GIS technology enables high quality output

Global Positioning System (GPS): GPS is a location system based on a constellation of about 24 satellites orbiting the earth at altitudes of approximately 11000 miles. GPS is widely used by civilians as well as defence personnel GPS tells as "where", where as GIS is not a single unit.

Components of GPS: GPS is not a single unit. It is a system & has a following three major components

a. Satellites

b. Ground Control Stations

c. GPS receives or units

Functions of GPS:

a. For connecting & storing points

b. For collecting & storing routes a path between two or more points

c. 'Go To' function is useful in guiding to a predetermined point.

d. GPS can be programmed to 'beep' when you are within a certain distance of the defined way point.

2. APPLICATIONS OF SPATIAL TECHNOLOGIES:

Many successful applications of spatial technologies exist at the more aggregate levels of agricultural planning and research. Geographic information also assists

in planning rural infrastructure, such as prioritizing national investments in rural roads, electricity, health and education. Geographic targeting at the level of small communities reduces the change that the intended recipients in rural areas include emergency planning and response. The key to successful GIS applications is the availability of detailed spatial data. While remotely sensed information and GPS-based field surveys help plug some data gaps, much information is still difficult to obtain at a geographic scale that is relevant for operational impact. Strengthening of formal and informal capabilities for spatial-data collection at local levels is thus one of the priority needs.

Fisheries:
Remote sensing data help in regular management of water resources and useful in finding different types of bio resources. Remote sensing plays potential role in both rapid & comprehensive EIA. For detection and monitoring of the water pollution, remote sensing proves useful. Remote sensing is applicable in acquiring regarding offshore engineering activities, fisheries surveillance, ocean features, coastal regions and storm forecast operations. In GIS identification of suitable sites for freshwater & brackish water aquaculture, fish disease modelling & management, environmental impact Assessment, fish disease modelling & management. In GIS and GPS it is provided to be a useful tool in providing cost effective data for creation & updating of GIS. In marine fisheries, it would for a survey vessel to continuously monitor water quality along any transect while recording the exact location. The real time mapping of data could then be done.

Forest Management:
Remote sensing is a new technique that bases on the aerial photography and developed in the early days of 1960's (Xu 1998). The basic function of remote sensing in the management of forest resource is to acquire the terrestrial information. The remote sensor carried by aircraft such as plane, dirigible or satellite can collect data of the ground, and with this information we can distinguish terrestrial objects by the procedure of recording, sending, analysis and classification(Sun et al 1997).GPS is an aero navigation system and timing system(Li 1998). Regarding the distance as basic observation unit, GPS can calculate the receptor's position by measuring the fake distance of several satellite at the same time (YAO 2000).GIS as a new technique development with the computer technique since 1960's(Lu et al 1998), is a spatial information system that comprises four basic elements of computer hardware, computer software , data and user. As tools of spatial management and analysis, GIS has important function in forest management.

Precision Agriculture:
Remote Sensing (RS) is the science of obtaining and interpreting information from a distance, using sensors that are not in physical contact with the object being observed (Jensen, 1996).RS and GIS technologies have been of great use to planners in planning for efficient use of natural resources at national, state and district level. Application of these technologies in the management of natural resources are increasing rapidly due to great strides made in space-borne RS satellite in terms of spatial , temporal, spectral and radiometric resolutions (Venkataratnam, 2001). PA is based on innovative systems approach and these new systems approach depends on a combination of fundamental technologies such as Geographic Information System (GIS), Global Positioning System (GPS), computer modelling, ground based/airborne/satellite remote sensing, variable rate technology and advanced information processing for timely in-season and between season crop management.

3. COMBINED USE OF THREE–S TECHNIQUES:
As tools of spatial information processing, each of the three-S techniques has its own characters and can fulfil its own function separately. The problems they can solve are relative, but each of them has their own advantage and deficiency.GIS has strongly functioned on inquiry, analysis and synthetic processing, but it is very difficult for GIS to get the data. RS can collect the information of large area effectively, but limited by the band of spectrum, and the precision of its data orientation and classification function is lower. GPS can provide the target's position quickly, and this has special significance for spatial data, but it can't provide the attribute data of the target. So the combination and integration of the three has become a trend of space science and spatial information system. Finally, the three –S is favourable to set up modern national monitoring system of forest resource, which can dynamically monitor the special information of forest resource, include not only the macro change of forest resource on national or regional scale, but also local change on county scale (Dai 1999). Other successful GIS applications in rural include emergency planning and response.

4. CONCLUSION & FUTURE SCOPE:
Geographic information technologies will continue to provide considerable indirect benefits through better-informed policymaking, research, planning, and development support by both government and non-government agents. From our collective experience GIS using in teaching and remote sensing used for agricultural sciences, landscape design, urban forestry, geology, and Extension services. GIS-GPS-RS technologies have rapidly become more accessible, less expensive, and more sophisticated. As a result of the relatively fast evolution of geospatial technologies, many professionals may either be unaware of their capabilities or may have an obsolete understanding of their potential and current implementation. There is a clear need for GIS-GPS-RS technologies. Lack of understanding can lead users to overestimate the usefulness of geospatial technologies. Carefully consider the needs of the intended users .It has been our own experience that it is impractical to expect all members of your staff or faculty to learn to use GIS-GPS-RS technologies. Maintain Spatial Integrity of your data. Developing metadata documentation of your spatial data cannot be emphasized enough. Another important point to keep in mind before establishing and working with a GIS database is that your data can quickly become much disorganized. The future might also bring cheaper and easier-to-use tools that enable farming communities to generate or access information about individual and shared resources without external facilitators. However, the cost-effectiveness of introducing GIS technologies into poor communities and the potentially harmful social consequences will continue to require close scrutiny by researchers and policymakers alike.

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